Ministry of the ENVIRONMENT

Industrial Wastes Survey

City of Stratford

1971

Environment Ontario

A

REPORT

on

AN INDUSTRIAL WASTES SURVEY

of

THE CITY OF STRATFORD

June - September 1971

Industrial Wastes Branch
MINISTRY OF THE ENVIRONMENT

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SECTION I

AN INDUSTRIAL WASTES SURVEY OF THE CITY OF STRATFORD

INTRODUCTION

An industrial waste survey was conducted in the City of Stratford by the Industrial Wastes Branch of the Ontario Ministry of the Environment (formerly the Division of Industrial Wastes of the Ontario Water Resources Commission) during the period from June to September, 1971. The purpose of this survey was to assess the pollution control programs at all the major industries whether discharging to the Stratford municipal sanitary sewerage system or to storm sewers and the Avon River.

SUMMARY

The industrial waste survey of the industries in Stratford indicated that, while industries used a significant portion of the water supplied by the Stratford P.U.C., the resulting wastewater discharges did not pose any severe pollution problems either as a result of discharge to sanitary or storm sewer systems.

Of the 18 industries surveyed, only two industries discharging to storm sewers had effluents with contaminant concentrations in excess of the City's Sewer-use By-law limits and the Ministry of the Environment objectives for discharge to a watercourse. Three industries discharging to the municipal sanitary sewers had effluent qualities not in compliance with the City Sewer-use By-law. These industries have been notified of the pollution problems and corrective action has been initiated.

The escape of oil to both the Avon River and to the sanitary sewers has in recent years endangered wild life

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and caused operational and clean-up problems at the sewage treatment plant. All known industries using copious amounts of oil have been advised to exercise caution in their oil handling practices.

There were no discernible adverse effects on the municipal sewage treatment facilities resulting from the discharge of industrial wastes, with the exception of these intermittent occurrences of oil. Elimination of the oil problem, segregation of about 250,000 gpd of cooling water found entering the sanitary sewers for discharge into the storm sewers, and improved treatment and control at the three industries found discharging unacceptable effluents will no doubt benefit the operation and extend the life of the sewage treatment plant. Improved surveillance and enforcement of the Sewer-use By-law by City personnel should also be initiated.

DETAILS OF SURVEY

The Industrial Directory of the City of Stratford, prepared by the City Industrial Commission, lists 72 industries and service establishments. Many of the service establishments and some of the industries listed were not visited during this survey, as either the type of industry, the size of the plant or the water usage data supplied by the Stratford P.U.C. suggested that these particular establishments did not emit significant industrial wastewaters.

The remaining industries, 18 in total, were visited to assess their industrial waste control status. Supervisory personnel were first contacted to determine the nature, sources and quantities of liquid wastes and then samples of the wastewaters discharged were obtained.

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Survey reports on these industries were then prepared and are provided in Section II of this report.

The samples collected were submitted to the Ministry of the Environment Laboratory in Toronto (formerly OWRC Laboratory) for analysis according to the procedures outlined in "Standard Methods for Examination of Water & Wastewaters", Thirteenth Edition, published by the U. S. Health Association.

Industrial Water Supply and Usage

Most of the industries obtain process, cooling and potable water from the Stratford Public Utilities Commission. In some cases private wells are used as a supplementary source of water. However, the volume of water obtained from private sources is insignificant when compared to the total industrial water usage. In 1971 the Stratford Public Utilities Commission supplied an average of 2.80 mgd to all users in Stratford, with about 1.70 mgd going to the commercial and industrial establishments. The 18 plants considered in this survey used a total of 1.66 mgd of which 1.575 mgd was for cooling and processing purposes and the remainder for sanitary and drinking purposes.

Industrial Waste Disposal

At the time of the survey the total industrial wastewater discharge from the major industries was approximately 1.575 mgd. Approximately 53 per cent, or 0.833 mgd, of this total was discharged to the Avon River, via the storm sewer system, while the remaining 47 per cent entered the Stratford sanitary sewerage system.

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Sewage Treatment

The Stratford sewage treatment plant was completed in 1957 as a joint project of the City and the Ontario Water Resources Commission. The plant has a design capacity of 6 mgd and has an ability to handle 18 mgd in the additional primary settling facilities during heavy rainfall or runoff periods.

The plant includes facilities for primary sedimentation followed by activated sludge secondary treatment, final settling and effluent chlorination. Sludge is handled in an anaerobic sludge digestion facility.

Table I depicts typical analytical data at the sewage plant during the period February 1971 to July 1971. Not shown in this Table, however, are incidents of oil entering the sewage facilities causing serious operational and clean-up problems.

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TABLE I

STRATFORD SEWAGE TREATMENT PLANT

TYPICAL INFLUENT & EFFLUENT CHARACTERISTICS

DATE	RAW SEWAGE		FINAL EFFLUENT	
	BOD_5	SUSP. SOLIDS	BOD_5	SUSP. SOLIDS
July 15/71	100	230	14	10
July 6/71	65	110	14	20
May 13/71	240	240	25	10
May 4/71	85	90	10	15
Apr. 27/71	100	150	6	10
Apr. 15/71	90	190	8	5
Mar. 25/71	110	290	5	5
Mar. 11/71	90	170	8	5
Feb. 16/71	460	290	7	5
	85	90	7	10

All analysis expressed in parts per million (ppm)

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CONTROL OF INDUSTRIAL WASTE DISCHARGES

The legislation for controlling industrial waste discharges in Stratford takes two forms. First, under the terms of Section 32(1) of The Ontario Water Resources Act, the discharge of any polluting material by any municipality, industry or person to any watercourse is prohibited.

The quality of any industrial wastes discharged to a watercourse, storm sewer, etc. should, therefore, comply with the Ministry of the Environment objectives which were developed to protect and upgrade the quality of the receiving water. Any industry intending to install facilities to treat and/or dispose of wastes to a watercourse, storm sewer, etc. is required to obtain approval of such facilities from the Ministry of the Environment prior to their installation.

Second, to protect the municipality's sewer and treatment systems, the City has enacted a Sewer-use By-law (By-law Number 65-70) to control and regulate the discharge of all material into its storm and sanitary sewers. It is important that close control be exercised over the industrial wastes being discharged to the municipal systems, particularly when biological processes are utilized for the treatment of wastewaters. It is the municipality's responsibility to administer and carry out a suitable by-law enforcement program.

Table II summarizes the requirements and objectives for the discharge of industrial wastes to storm and sanitary sewer systems or to open watercourses, ditches, etc. in the City of Stratford. Storm sewer and watercourse discharge requirements listed are both the City By-law limits and Ministry of the Environment objectives.

A sewer-use by-law in an industrialized community should contain a clause which permits the municipality to enter into special agreements with industry for treatment of

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TABLE II

SUMMARY OF REGULATIONS & OBJECTIVES FOR WASTE DISCHARGES TO SANITARY AND STORM SEWERS AND WATERCOURSES in the City of Stratford

Waste Characteristics	Sanitary Sewer	Storm Sewer or Watercourse
Temperature	Not to exceed 150°F	Not to exceed 150°F
Ether Solubles	150 ppm (animal or vegetable) 15 ppm (mineral)	15 ppm (total)
Gasoline, benzene, naphtha, fuel oil, acetone, solvents or other inflammable liquids	Prohibited	Prohibited
Solids, e.g. rags, ashes, cinders, garbage, feathers, tar, mud, straw, metal etc. capable of obstructing sewers	Prohibited	Prohibited
Noxious or malodorous gases	Prohibited	Prohibited
Animal wastes such as hair, wool, paunch manure etc.	Prohibited	Prohibited
pH	Acceptable range 5.5 - 9.5	Acceptable range 5.5 - 9.5
Phenolic compounds	1.0 ppm	20 ppb
BOD_5	300 ppm	15 ppm
Suspended Solids	350 ppm	15 ppm
Lead	5.0 ppm	1.0 ppm
Chromium as Cr	3 ppm	1 ppm
Cyanide as HCN	3 ppm	0.1 ppm
Copper as Cu	5.0 ppm	1 ppm
Nickel	5.0 ppm	1.0 ppm
Cadmium	5.0 ppm	1 ppm
Zinc	5.0 ppm	1 ppm
Iron	-	17 ppm
Sulphides	3.0 ppm	-

NOTE: ppm (parts per million) is approximately equivalent to milligrams per litre (mg/l).

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wastewaters which may not meet the By-law requirements for discharge to a sanitary sewer. In these instances the industry enters into an agreement with the municipality for the discharge of these wastes to the municipal system, and the municipality may in turn require the industry to pay a fee for the treatment of these wastes at the sewage treatment plant. These wastes, however, must be amenable to treatment by the processes employed at the sewage treatment plant and the capacity must be available in the system to handle them. Stratford has such a clause in its by-law.

DISCUSSION OF FINDINGS

The City of Stratford, although surrounded by some of the foremost mixed farm land in the Province, has developed into a vibrant, medium-sized industrial area because of its proximity to the heavily industrialized areas of Toronto and Hamilton.

Until 1954 the City's industrial life had been centered around the Canadian National Railways and its repair shop, but with the closing of this repair shop in 1954 and with the changeover from steam to diesel, more industrial diversification had to be developed to provide stability. This resulted in the City becoming a medium-sized mixed manufacturing area with wide diversification, as the alphabetical industry listing provided in Appendix I illustrates.

Since the industries cannot be conveniently divided into groups or classifications, discussions in this section will be kept on a general basis. Appendix II provides a summary of the waste loadings for the industries examined during this survey.

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Of the industries surveyed which discharge wastewater to the municipal sanitary sewer system, only three were found to be emitting contaminants in excess of the municipal Sewer-use By-law limits. In one case the wastewaters contained an average oil (mineral) concentration calculated to be 98 ppm and representing a loading of 250 lbs/day of oil, or equivalent of 30 gallons of oil per day. The second industry discharged an effluent on an intermittent basis containing on an average of 590 ppm suspended solids, 68 ppm iron and 2970 ppm sulphates resulting in loadings of 380, 45 and 1900 lbs/day respectively. A third industry's effluent contained an oil concentration of 31 ppm, representing a loading of 32 lbs. of oil per day.

From the results of the surveys of these industries discharging wastewaters to the sewage facilities, it would appear that, on a continuous basis, oil is the pollutant of most concern. Furthermore, it has been our experience in the metal working industry, which is predominant in Stratford, that batch dumps or unintentional escape of oil arising from faulty equipment, poor supervision and human errors are common and cause operational and clean-up problems at the sewage treatment facilities. Over the past few years there has been evidence of such incidents, of unknown origin, at Stratford, and thus it is imperative that industries handling significant amounts of oil for processing, quenching or heating purposes maintain close supervision of the storage and transfer facilities.

Of those industries sampled which discharge wastes to the storm sewer system, two were found to be discharging

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wastes in excess of the City's storm sewer By-law limits and Ministry of the Environment objectives for discharge to a watercourse. Similar potential oil problems were noted at some industries on the storm sewer system. As losses of oil present a hazard to wild life and would impair the quality of the receiving stream, the Avon River, extreme care must be taken by plant personnel to ensure that acceptable oil handling practices are followed.

It was noted during the survey that a large volume of industrial wastes containing chemicals such as trichloroethylene, oil and metal hydroxides were being disposed of by contractors who, in a majority of cases, were merely hauling these wastes to the local land disposal site. It is felt that the nature of some of these wastes is such that land disposal is not acceptable, and therefore steps should be taken to ensure that all wastes are treated or disposed of in an acceptable manner.

The amount of cooling water being discharged to the sanitary sewers was estimated to be in the neighbourhood of 250,000 gpd. This is a significant portion of the total industrial discharge of 742,000 gpd which should be eliminated from the sanitary sewer since hydraulic capacity at the treatment facilities is being wasted on clean water. It is realized that in most cases storm sewers are not available to receive these cooling waters for discharge to a watercourse. However, the City should attempt to make such facilities available to industries in Stratford in the future.

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GENERAL CONCLUSIONS AND RECOMMENDATIONS

Industry in Stratford uses a significant percentage of the total water supplied by the Stratford PUC (1.7 mgd vs 2.8 mgd). The resulting wastewaters discharged to both the sanitary sewers and to the Avon River via the storm sewer system do not usually cause serious problems.

The 18 major industries inspected during this survey discharge approximately 1.575 mgd of industrial wastewaters. About 53 per cent of this total was directed to the Avon River via the storm sewer system, while the remaining 47 per cent was discharged to the Stratford sanitary sewerage system.

Three industries were found to be discharging pollutants to the municipal sanitary sewers in excess of the City of Stratford Sewer-use By-law limits, while two were noted to be exceeding the municipality's storm sewer limits and Ministry of the Environment objectives for a storm sewer or watercourse discharge. In each case, the industries were notified and recommendations were made for corrective action.

Besides the normal continuous discharge of wastewater to the various sewer systems, the escape of oil from industry, either intentionally or unintentionally, has in the past caused serious problems in the Avon River and at the Stratford sewage treatment plant. Since most industries visited during this survey used, consumed or handled copious quantities of various types of oils, recommendations have been made for improved oil handling and surveillance at these industries.

Of the total industrial waste flow entering the sanitary sewerage system, it was estimated that approximately

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250,000 gpd was clean cooling waters. In some cases, storm sewers were not available for accepting these cooling waters. It is recommended, therefore, that attempts should be made by the municipality to provide this service, and the responsible industries make the necessary segregation of cooling water from contaminated wastewaters.

Furthermore, it is recommended that the City of Stratford take a more active role in the enforcement of its Sewer-use By-law. The City should assign technically oriented personnel to visit and become familiar with the operations of the industries on the sanitary and storm sewer system. Following this a regular surveillance program should be set up to monitor discharges from industry.

On the other hand, all industries in Stratford should examine their operations with a view to finding and eliminating sources and potential sources of pollution. Particular attention should be given to operations where oil or other hazardous materials are used and might escape due to equipment failure, human error etc.

Overall, industrial wastes had only a moderate impact on the operation of the Stratford sewage treatment facilities. The sewage treatment plant receives on an average 3.5 mgd of wastewater, of which 0.742 mgd is industrial wastes. It is obvious that, with the elimination of 0.25 mgd of cooling water from the system and with improved surveillance by the municipality of industries using large quantities of oil and/or discharging waste constituents exceeding the Sewer-use By-law limits, the impact of industrial wastes on the municipal system should become negligible.

Finally, this survey pointed out that a large volume

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of spent chemicals, oils and sludges was being disposed of by contractors at a local land disposal site. It is felt that these materials could pose a serious threat to surface and ground waters in the area. It is recommended that steps be taken by the City, in conjunction with the Waste Management Branch of the Ministry of the Environment and the industries involved, to develop a more suitable method of disposal for these materials.

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SECTION II

BLACKSTONE INDUSTRIAL PRODUCTS LIMITED

This plant, located at 533 Romeo Street, is engaged in the production of automotive and truck radiators and hot water heaters.

SUMMARY

Contaminated industrial wastes are collected and treated. Uncontaminated cooling waters are added to the treated wastes as they are being discharged to the municipal storm sewer system. At the time of the survey, although a high degree of treatment was being provided, the effluent did not meet with Ministry of the Environment objectives or municipal Sewer-use By-law limits. Remedial action is recommended.

All sanitary wastes are discharged to the sanitary sewer.

DETAILS OF SURVEY

Blackstone Industrial Products was visited on July 26, 1971 and sampled on September 29, 1971.

Personnel Interviewed

Mr. R. H. Gough - Vice-President and General Manager
Mr. D. Neirn - Plant Manager
Mr. F. Flewitt - Chemist

Description of Plant Processes

Copper strip material is processed through stamping operations to form coils and baffles which are then fabricated into radiators and heater cores. These are cleaned, then soldered, tested and painted for shipment.

Production and Operating Data

Total number of Employees - 365
Production Employees - 275

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Operating Schedule - 2 - 8 hr. shifts
5 days/wk.

Water Use and Distribution

Source - Municipal Supply
Volume - 151,000 gpd
Distribution - 14,000 gpd domestic
- 137,000* gpd industrial

* breakdown of industrial usage
2,000 gph - bright dip rinse
1,000 gph - #1 hot wash
750 gph - #2 hot wash
2,900 gph - bright dip process tanks, solder & radiator washing tanks and heater & radiator testing tanks.

Sources and Disposal of Liquid Wastes

All sanitary wastes from this plant are discharged to the municipal sanitary sewer. Uncontaminated rinses are discharged to the storm sewer system. Contaminated process wastes are treated in one of three systems as follows:

A) Rinse waters following the bright dipping step are heavily contaminated by copper, zinc and hexavalent chromium. These wastes are first acidified and chemicals are added to reduce the hexavalent chromium. The wastes are then neutralized with caustic to precipitate the metals. A portion of this clarified wastewater is recirculated into the wash tanks. The sludge portion of the treated solution is filtered and the filtrate is discharged to the storm sewers.

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B) A similar integrated system is used for the treatment of rinse and wash waters following the soldering step which is contaminated by zinc chloride and some organics from the soldering fluxes used.
Waste waters from the heater and radiator test areas become contaminated with zinc chloride. This contamination is removed by passing these wastes through de-ionization units to remove mainly zinc and chloride ions. The purified waters are then re-used in the test area.

C) The ion exchanger units are regenerated after a period of time. These high strength regenerant wastes are treated to neutralize excess acid and to precipitate the metals as metallic hydroxides. The hydroxides are then removed by filtration in a similar manner as the wastes from the previously mentioned integrated treatment systems.

Sampling and Analysis

Samples of the plant effluent were collected at hourly intervals on September 29, 1971 and combined to obtain composite samples.

The analytical results are presented below..

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Sample Description:

#1 : Total Plant Effluent taken at Creek - Composite - 9:00 a.m. - 12:00 noon

#2 : Total Plant Effluent taken at Creek - Composite - 1:00 p.m. - 4:00 p.m.

#3 : Total Plant Effluent taken at Creek - Composite - 9:00 a.m. - 4:00 p.m.

#4 : Effluent from filter - Composite - 11:00 a.m. - 4:00 p.m.

SAMPLE NO.	5-DAY BOD	SOLIDS TOT.	SOLIDS SUSP.	SOLIDS DISS.	pH AT LAB.	CHROMIUM TOT.	CHROMIUM HEX.	COPPER as Cu	IRON as Fe	LEAD as Pb	ZINC as Zn	CADMIUM as Cd.
1	6.0	1130	20	1110	8.1	.4	.14	.84	.72	1.7	5.7	.07
2	44	2760	15	2745	8.0	.6	L.01	.69	.43	1.3	4.5	.06
3	6.0	1150	20	1130	8.1	.49	.19	.74	.41	1.6	4.8	.06
4	550	12000	15	11985	8.0	.02	.01	.26	.10	L.1	1.6	L.02

All analyses except pH expressed in parts per million

L = less than

WASTE LOADINGS

The following waste loadings to the storm sewer system have been calculated using the analytical results reported above and a waste flow of 137,000 gpd.

Suspended Solids	-	27 lb/day
Total Zinc as Zn	-	8 lb/day
Total Lead as Pb	-	2.33 lb/day
Total Copper	-	1 lb/day
Total Chromium	-	.5 lb/day
Hex Chromium	-	.2 lb/day

DISCUSSIONS OF RESULTS, CONCLUSIONS & RECOMMENDATIONS

At the time of the survey the effluent to the storm sewer in terms of the zinc concentration at 1.6-5.7 ppm and the BOD_5 content at 44 ppm and 550 ppm did not meet Ministry of the Environment objectives for a discharge to a watercourse. The Company has been advised of our findings as to the zinc contamination and it is expected that corrective action has already been taken. Recent data submitted by the Company indicate a reduction in the zinc concentration in the effluent.

The high BOD_5 content probably stems from the organic materials utilized in the soldering operation and may only be an intermittent discharge. However, it is recommended that the Company investigate this contamination with a view to segregating the responsible source of wastes for possible disposal into the municipal sanitary sewer system.

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CLEAVER-BROOKS OF CANADA, LIMITED

This Company, located at 161 Lorne Avenue, is engaged in the production of industrial boilers.

SUMMARY

Wastewaters discharged to the storm sewer system were found to be of acceptable quality. The oil interceptor should be properly maintained and oil handling practices supervised.

DETAILS OF SURVEY

This plant was visited on June 16, 1971, at which time samples of the plant effluent to the storm sewer system were collected.

Personnel Interviewed

Mr. B. Crawford - Maintenance Engineer

Description of Plant Processes

Industrial boilers are fabricated from steel castings and plate steel. These boilers are tested before they leave the plant.

Production and Operating Data

Total Number of Employees - 55

Number of Production Employees 30

Operating Schedule - 1 - 8 hr. shift most of the year
2nd shift July to October
5 days per week

Production Volume - 650 boilers per year.

Water Use and Distribution

Source - Municipal Supply

Volume - 17,000 gpd (average over 1970)

Distribution - 1,000 gpd sanitary
- 16,000 gpd industrial process.

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Industrial process water includes:

1) cooling water for 2 compressors
2) make-up water on 3 boilers
3) hydrostatic testing of boilers
4) boiler fuel testing area

Sources and Disposal of Liquid Wastes

In this plant water is used for cooling compressors and in the testing of boilers. Wastewaters from the fuel test area are passed through an oil interceptor to remove any oil prior to discharge to the storm sewer system. All other industrial waters are discharged directly to the sewer system.

Sampling and Analysis

Grab samples of the effluent to the storm sewer system were collected. Presented below are the analytical results of these samples taken on June 16, 1971:

Sample Description:

#1 - Effluent to Storm Sewer System - Grab 11:30 a.m. June 16, 1971

	S O L I D S			pH	IRON	ETHER	TOTAL PHOSPHORUS
BOD_5	TOT.	SUSP.	DISS.	AT. LAB.	as Fe	SOLUBLE	as P
.8	840	5	835	8.1	.09	0**	.40

** < 1 PPM

CONCLUSIONS AND RECOMMENDATIONS

At the time of the survey the waste discharge from the plant was satisfactory for disposal to a storm sewer system. In the past the Company has had some problem of oil in their effluent and this had to be remedied by the installation of an oil interceptor and a high level alarm system. The plant effluent therefore should not cause any pollution

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problems if these new facilities are properly maintained. In addition, oil handling practices should be carefully supervised to prevent spills, leaks, etc. to the sewer systems.

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COMMUNICATION APPARATUS COMPANY CANADA LTD.

This plant, located at 1131 Erie Street, is engaged in the production of telephone loading coils and station equipment.

SUMMARY

There are no industrial wastes generated at this plant.

DETAILS OF SURVEY

The Communication Apparatus plant was visited on June 1, 1971.

Personnel Interviewed

Mr. B. Jenson - Plant Superintendent

Description of Plant Processes

Small wire load coils are wound and then attached to bundled cables. The resulting loading coils are first coated and then crated for shipment.

Production and Operating Data

Total Number of Employees - 45

Production Employees - 35

Operating Schedule - 8 hrs/day - 5 day/wk.

Water Use and Distribution

Source - Municipal Supply

Volume - 3,500 gpd

CONCLUSION

There are no industrial wastes generated at or discharged from this plant. All domestic wastes are discharged to the sanitary sewer system.

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COOPER-BESSEMER OF CANADA LIMITED

Cooper-Bessemer, located at 105 St. Patrick Street, produces large engines and compressors used primarily in the petroleum industry.

SUMMARY

All contaminated wastes from the pickling and plating operations are discharged to the sanitary sewer. Uncontaminated cooling water and test water is discharged directly to the municipal storm sewer system. At the time of the survey it was found that the tin metal concentration in the effluent to the sanitary sewer was higher than the normally accepted 1 ppm. Remedial action is recommended.

DETAILS OF SURVEY

Cooper-Bessemer of Canada Ltd. was visited on July 7, 1971, at which time staff of this plant were interviewed and samples of the wastewater discharged were collected.

Personnel Interviewed

Mr. R. N. Campbell	-	Vice-President and Plant Manager
Mr. R. Byatt	-	Plant Engineer

Description of Plant Processes

In the plant various machining and milling operations are performed on stock material to produce finished engine or compressor parts, which are then assembled into the finished products. The product is load-tested at the plant before shipment to the customer.

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Operating and Production Data

Total Number of Employees	-	168
Production Employees	-	103
Operating Schedule	-	2 - 8 hr. shifts per day 5 days per week.

Water Use and Distribution

Source	-	Municipal Supply
Volume	-	55,000 gpd (avg.over 1970)
Distribution - Domestic	-	3,000 gpd
Pickling	-	11,000 gpd
Cooling	-	13,000 gpd
Tin Plating	-	5,000 gpd
Wash Rack	-	100 gpd
Test Area #1	-	11,000 gpd
Test Area #2	-	12,000 gpd

Sources and Disposal of Liquid Wastes

All industrial wastes in this plant originate from three main areas which are steel phosphating, tin plating and test areas. All contaminated wastes are discharged directly to the sanitary sewer system. Uncontaminated wastes from the test bed area in the form of hydrostatic test process water is discharged to the storm sewer system. This is an intermittent discharge because water is used only when an engine is being tested.

Oil-contaminated water originating from the test areas is directed to an outside storage tank where the two-component mixture is allowed to separate. The water phase is drained off the bottom as required and used for yard dust control. There are no drains in this area; therefore, it is felt that this is an acceptable form of disposal for

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this waste. The oil layer is trucked away as required (approximately once per year).

Waste from the phosphating operation include batch dumps of Chem Clean 46 (Kent Industrial Chemicals), an alkali cleaner, and Chem. Phos. A90, an acid cleaner (Kent Industrial Chemicals). These are mixed together to neutralize each other before being discharged to the municipal sanitary sewer.

Chem Rinse 201 - (Kent Industrial Chemicals) used in the plating department contains 16 per cent hexavalent chromium. When this tank is depleted the hexavalent chromium is converted to trivalent chromium by the addition of bi-sulphite and the solution is then neutralized by the addition of caustic. The precipitated chromium hydroxide is allowed to settle out before the supernatant is discharged to the sanitary sewer system.

Sampling and Analysis

Grab and composite samples of the sewered plant effluent were taken on July 7, 1971. The analytical results were as follows:

Sample Description:

#1 : Discharge to Sanitary Sewer including sanitary wastes.- Composite 2:00 p.m. to 3:00 p.m.

#2 : Running rinse from phosphating operation - Grab 2:30 p.m.

#3 : Tin Plating rinse - Grab 3:00 p.m.

(NOTE: ALL CONC. IN ppm EXCEPT pH UNLESS OTHERWISE INDICATED)

SAMPLE NO.	BOD_5	S O L I D S TOTAL	SUSP.	DISS.	COD	TIN as Sn	pH AT LAB.	IRON as Fe
1	55	1090	190	900	165	1.7	6.9	-
2	-	-	20	-	-	-	7.4	.45
3	-	-	-	-	-	5.1	8.8	-

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Waste Loadings

The waste loadings were calculated using the estimated waste flow (to the sanitary sewer system) and the analytical results of the composite sample of the sewered effluent (flow of 32,200 gpd) -

BOD_5	(Biochemical Oxygen Demand)	- 18.	lbs/day
COD	(Chemical Oxygen Demand)	- 53	lbs/day
Tin		- .55	lbs/day
Suspended Solids		- 57	lbs/day

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The quality of wastes discharged at the time of sampling, with the exception of the tin content, was satisfactory for the discharge to the sanitary sewer system. The dumping of spent solutions from the phosphating operations and the plating operations could be a cause of future problems. The Company indicated that these solutions are treated (i.e. mixed to effect neutralization) prior to being discharged to the sanitary sewer. Having reviewed the treatment procedures, it would appear that these wastes receive acceptable treatment. The Company should maintain records as to the date of such batch dumps and the treatment provided, so that any problems with these methods may be eliminated.

The concentration of tin in the effluent was found to be slightly greater than 1 ppm - the concentration normally accepted for discharge to sanitary sewers. The Company should investigate methods to reduce this metal contamination by providing better in-plant control measures (e.g. counter-current rinses, drip trays etc.).

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CRANE CANADA LIMITED

This plant, located at 15 Crane Avenue, produces bath tubs, sinks and wash tubs.

SUMMARY

The normal wastewaters from this plant were found to be satisfactory for discharge to the sanitary sewer system. However, during periods of batch tank dumps the quality of the effluent was not acceptable. Alternate disposal of these batch dumps is suggested. In addition, cooling waters should be segregated for disposal to the storm sewer system.

DETAILS OF SURVEY

Crane Canada was visited and surveyed on July 6, 1971 and July 8, 1971.

Personnel Interviewed

Mr. G. Schroeder	-	Plant Engineer
Mr. L. Laraille	-	Maintenance Supervisor

Description of Plant Processes

Sheet steel is stamped and welded to form bath tubs, wash tubs or sinks which are then pickled prior to being enamelled. After the baking process the finished products are packaged for shipment and damaged products are recycled through the system. A small number of fiberglass products (i.e. preformed bathrooms, water fountains and vanity tops) are produced in a pilot plant operation.

Production and Operating Data

Total Number of Employees	-	145
Production Employees	-	113
Operating Schedule	-	2 - 8 hr. shifts 5 days/week.

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Water Use and Distribution

Source	-	Municipal Supply
Volume	-	68,000 gpd (average over 1970)
Distribution	-	3,000 gpd sanitary
	-	51,000 gpd cooling for welders
	-	13,000 gpd pickle line
	-	1,000 gpd porcelain preparation and clean-up.

Sources and Disposal of Liquid Wastes

All wastes including cooling water from this plant are discharged to the municipal sanitary system. Periodically (usually at the end of the afternoon shift) any spent solutions from the pickle line are batch dumped to the sanitary sewer. These include alkaline cleaners, 7 per cent sulphuric acid solution, nickel sulphate solution and neutralizer solution. Contaminated rinses from this line are collected, neutralized and then discharged along with the above-mentioned solutions to the sewers.

About the same time that these dumps are occurring, the porcelain spray equipment is cleaned. The wastes generated in this operation are discharged to a sludge pit where any solid material is removed by settling. The supernatant is then discharged to the sanitary sewer. The solid sludge material is hauled away to the local land disposal site twice a year or as necessary.

Sampling and Analysis

Presented below are the analytical results of the samples taken from the sewered plant effluent on July 6, 1971 and July 7, 1971

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SAMPLE NO.	5-DAY BOD	SOLIDS			pH AT LAB	TOTAL IRON	TOTAL NICKEL	SULPHATE as SO_4	COD	TOTAL PHOSPHOROUS
		TOTAL	SUSP.	DISS.						
1	18	9660	590	9070	9.0	68	.02	2970	60	5.4
2	-	24210	1600	22610	10.3	348	.07	5310	150	-
3	10	1340	40	1300	7.3	7.3	1.2	30	30	.60

Sample Description:

#1 : Final effluent from plant to Sanitary Sewer. Composited 2:45 - 3:45 at 15 min. intervals during period of batch dumps on pickling line.

#2 : Final effluent from plant to Sanitary Sewer after pumping of neutralization pit began. Grab sample 3:00 a.m. July 6, 1971.

#3 : Final effluent from plant to Sanitary Sewer. Grab sample taken 8:30 a.m. July 7, 1971 during period of normal pickling line operation.

Waste Loadings

Loadings from this plant under the normal and batch dump conditions are given as:

	Normal	Batch Dump
	lbs/day	lbs/day
Suspended Solids -	25	380
Iron -	5	45
Sulphates -	30	1900

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CONCLUSIONS AND RECOMMENDATIONS

The concentrations of some of the contaminants found in the discharge from Crane Canada Limited on July 6, 1971 during a period of tank dumps were far in excess of the limits as stated in the City of Stratford Sewer-use By-law. However, samples taken on July 7, 1971 show that the effluent from Crane during periods when no batch dumps were being carried out was suitable for discharge to the sanitary sewer system. The Company should, therefore, investigate alternate methods of disposal of materials presently batch-dumped to reduce the effluent loading to the sanitary sewer system.

More than half of the wastewaters discharged from this plant to the sanitary sewer is uncontaminated cooling water and should be discharged to the storm sewer system. This diversion would reduce the industrial hydraulic loading at the sewage treatment plant.

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DOMINION CHAIN COMPANY LIMITED

This plant, located at 617 Douro Street, is engaged in the production of chain products and brake cables.

SUMMARY

Industrial wastes at this plant originate from the heat treating area and the plating department. At the time of the survey the wastes from the plating department in the form of running rinses were unacceptable for discharge to the storm sewer. Remedial action is recommended in this report. Effluents discharged from water quench tanks in the heat treating department contained concentrations of suspended solids slightly higher than municipal sewer-use by-law limits and Ministry of the Environment objectives.

DETAILS OF SURVEY

Dominion Chain was visited and surveyed on July 6, 1971 and September 30, 1971.

Personnel Interviewed

Mr. O. Schavo - Plant Engineer

Description of Plant Processes

In this plant steel wire and bar stock is formed into chain links which are welded together. Various sizes of chain from less than 1/8" link size to over 8" link size are produced. After welding, the chain is strengthened by heat treatment and then either polished or plate-finished.

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Production and Operating Data

Total Number of Employees	-	430
Production Employees	-	350
Operating Schedule	-	3 - 8 hr. shifts 5 days/wk.
Production Volume	-	150 tons/wk.

Water Use and Distribution

Source	-	Municipal Supply
Volume	-	172,000 gpd average
Distribution	-	32,000 gpd sanitary
	-	140,000 gpd total industrial - (126,000 gpd used in plating dept.)

Source and Disposal of Industrial Wastewaters

All industrial wastes arising from the heat treating area and plating area are discharged untreated from the plant to the storm sewer system. The wastes from the heat treating area are comprised mostly of cooling waters, whereas the wastewaters from the plating area are made up of hot and cold running rinses.

Sampling and Analysis

Samples were collected of the sewered plant effluent on September 30, 1971 and the analytical results of the final effluent are shown below:

SOLIDS				CYANIDE	CHROMIUM as Cr	
TOTAL	DISS.	SUSP.	pH	TOTAL	TOTAL	HEX
1050	35	1015	7.5	1.8	4.2	1.9

All analyses except pH expressed in parts per million

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Waste Loadings

Based on the analytical results and water usage at the plant, the following waste loadings were calculated:

Suspended Solids	-	38 lbs/day
Cyanide as HCN	-	2.2 "
Total Chromium	-	5.3 "

CONCLUSIONS AND RECOMMENDATIONS

At the time of this survey all plating wastes from this plant were discharged directly with no treatment to the storm sewer system. The concentration of cyanide, chromium and suspended solids were above the City By-law limits and the Ministry of the Environment objectives. It is therefore recommended that the Company provide suitable in-plant control and treatment to render the plating room effluent acceptable for discharge to the storm sewer system. It should be noted that since this survey was conducted the Company has engaged a consultant to review and recommend corrective measures to solve the noted pollution problem at this plant.

Large volumes of oil are maintained in this plant for heat treatment of metal parts and, as such, close supervision and care must be exercised in this area to ensure that oil does not escape to the storm or sanitary sewer system via leaks, ruptures, spills etc.

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FAG BEARINGS LIMITED

This plant is located at 801 Ontario Street and produces ball bearings of assorted sizes.

SUMMARY

Contaminated wastes from this plant were discharged to the sanitary sewer system and contained oil in concentrations exceeding City of Stratford Sewer-use By-law limits. These wastes passed through a gravity-type oil interceptor before entering the sanitary sewer system, but it is believed that some of the oil escaping to the sewer is in the emulsified state and would not be removed by this separator. Remedial action is recommended. The cooling water discharge to the storm sewer system was of acceptable quality.

DETAILS OF SURVEY

FAG Bearing was visited and wastewater samples were collected on June 15, 1971.

Personnel Interviewed

Mr. O. Weth	-	Managing Director
Mr. T. O'Grady	-	Plant Engineer

Description of Plant Operations

In this plant milling, grinding and other machining operations transform bar stock into ball bearing products of assorted sizes. A large quantity of oil is utilized in these operations, the majority of which is reclaimed for re-use.

Production and Operating Data

Total Number of Employees	-	450
Number of Production Employees	-	270
Operating Schedule	-	2 - 8 hr. shifts 5½ days/week
Production Volume	-	600,000 lbs/month (raw material)

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Water Use and Distribution

Source	-	Municipal Supply Private Well
Volume	-	236,000 gal/day (avg.over 1970)
Distribution	-	5,000 gpd domestic
	-	127,000 gpd indirect cooling water
	-	104,000 gpd industrial process water

Sources and Disposal of Liquid Wastes

All sanitary wastes from the plant are discharged to the sanitary sewer system.

Approximately 127,000 gpd uncontaminated cooling water is discharged directly to the storm sewer system. Wastes which may contain oil first pass through a gravity-type oil interceptor to remove any free oil before these wastes, amounting to about104,000 gpd, are discharged to the sanitary sewer system. Any batches of spent process oil are collected and hauled away by United Oil Services in Brussels.

Four main types of oil are used in the plant - soluble cutting oil, honing machine oil (a mineral base oil), quench oil used in heat treating parts and kerosene used for cleaning purposes.

Sampling and Analysis

Presented below are the analytical results of samples taken from the sewered plant effluents on June 15, 1971.

Sample Description:

#1 : Effluent to sanitary sewer (Composited over two hours at 30 minute intervals)

#2 : Effluent to storm sewer (Composited over two hours at 30 minute intervals)

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SAMPLE NO.	5-DAY BOD	SOLIDS TOTAL	SOLIDS SUSP.	SOLIDS DISS.	COD	pH AT LAB	TOTAL IRON	SOLUBLE IRON	ETHER SOLUBLES (Oils)
1	90.2	660	110	550	200	8.6	2.3	.11	31
2	2.0	300	5	295	<10.0	8.1	.3	.0	2

Waste Loadings

Based on the analytical results and the water use data, the daily waste loadings were found to be:

	Sanitary System	Storm System
BOD_5 (Biochemical Oxygen Demand)	95 lbs/day	2.6 lbs/day
Suspended Solids	115 lbs/day	6.4 lbs/day
COD (Chemical Oxygen Demand)	210 lbs/day	<10 lbs/day
Total Iron	2.4 lbs/day	.4 lbs/day
Ether Soluble Material	32 lbs/day	2.6 lbs/day

CONCLUSIONS AND RECOMMENDATIONS

On the day of the survey the discharge to the sanitary sewer contained ether soluble (oils) material in excess of the Municipal By-law limit of 15 ppm. This resulted in a loading of 32 lbs/day of oil to the sanitary system. It is recommended that the Company implement the necessary action to lower the concentration (and loading) of oil discharged to the sanitary sewer system. It is believed that some of the oil escaping to the City sewer system is emulsified (i.e. "soluble" oil) and, hence, it cannot be removed by gravity separation alone. The Company should determine whether chemical treatment to break emulsions is a necessary first step in their pollution control program.

A sample taken of the storm sewer effluent indicated that at the time of the survey this discharge met both the By-law limits and Ministry of the Environment objectives.

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During the inspection made at the plant it was noted that at some previous time oil had been dumped into the sanitary sewer system. This is not an acceptable practice and steps must be taken to ensure that this is not allowed to happen again. Any waste oil should be collected for suitable disposal. Also, close supervision must be maintained at oil storage and transfer facilities to prevent accidental discharges to the sewer systems.

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HEADWATER-PERTH CHEESE & FOODS LTD.

Headwater-Perth Cheese & Foods Ltd., located at 423 Erie Street, is engaged in the packaging of processed cheese.

SUMMARY

The process waste from this plant is uncontaminated once-through cooling water, which is acceptable for discharge to the storm sewer system.

DETAILS OF SURVEY

Headwater Perth Cheese & Foods Ltd. was visited on June 5, 1971.

Personnel Interviewed

Mr. F. Leslie	-	Owner
Mr. R. Beimers	-	Plant Manager

Description of Plant Processes

Block cheeses are cut into one-pound and smaller pieces and these are packaged for re-sale.

Water Usage

Source	-	Municipal Supply
Volume	-	20,000 gpd (avg over 1970)

Source and Disposal of Liquid Wastes

All domestic wastes are discharged to the sanitary sewer system. The only industrial waste is cooling water used in refrigeration units. This wastewater is discharged to the municipal storm sewer system.

CONCLUSIONS AND RECOMMENDATIONS

At the time of this survey the wastes which were discharged to the municipal storm sewer system met with Ministry of Environment objectives for discharge.

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KORLIN LIMITED

Korlin Limited, located at 577 Erie Street, produces sheet plastic and plastic colour concentrates.

SUMMARY

The effluent from this plant appeared suitable for discharge to the storm sewer system. The screening facilities should be periodically inspected and cleaned.

DETAILS OF SURVEY

This plant was visited on June 8, 1971, at which time staff of the plant were interviewed. No samples were taken because the only process waste is once-through cooling water.

Personnel Interviewed

Mr. D. Finn - Engineering & Maintenance

Description of Plant Processes

Korlin dry-blends plastic resin material and colour pigment which is then extruded into plastic sheets or into colour concentrate. This extruded material is cut to the desired size and packaged for shipment.

Production and Operating Data

Total Number of Employees	-	50
Production Employees	-	35
Operating Schedule	-	3 - 8 hr.shifts/day 5 days/week

Water Use and Distribution

Source	-	Municipal Supply
Volume	-	247,000 gpd (avg over 1970)
Distribution	-	1,000 gpd sanitary
	-	246,000 gpd industrial cooling

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Sources and Disposal of Liquid Wastes

The liquid wastes from Korlin Limited consist of domestic sewage and once-through cooling water. The domestic wastes are discharged to the municipal sanitary sewer. The cooling water is used for both direct and indirect cooling. The direct contact water is used to cool colour concentrate, before the pelletizing operations. The indirect cooling water is used to cool heat exchange fluids (either 25 per cent Dowtherm SR in water or distilled water) on process equipment.

The indirect cooling water is discharged directly to the municipal storm system, while the direct contact cooling water is screened to remove any suspended plastic material before entering the storm sewer system.

Sampling and Analysis

No samples were taken at this plant.

CONCLUSIONS AND RECOMMENDATIONS

The spent cooling water from Korlin appeared suitable for discharge to the storm sewer system at the time of the survey. Care should be exercised at the screening facilities to ensure that pelletized solids do not escape to the sewer system.

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NOVATRONICS OF CANADA LIMITED

Novatronics of Canada Limited, located at 677 Erie Street, produces precision rotating components for the electronics industry.

SUMMARY

Since this plant only produces precision electronic parts, they do not use excessive quantities of water. The only industrial wastes are discharged to the storm sewer system and are comprised of some cooling and cleaning waters, which were found to be acceptable for this form of disposal. A small volume of spent grinder coolant is used to control parking lot dust - an acceptable means of disposal in this case.

DETAILS OF SURVEY

Novatronics was visited on June 17, 1971. No samples were taken.

Personnel Interviewed

Mr. K. Reed - Industrial Engineer

Description of Plant Processes

In the plant electrical components are assembled to produce precision electric counters for the electronics industry.

Production and Operating Data

Total Number of Employees	-	110
Production Employees	-	65
Operating Schedule	-	8 hrs./day 5 days/wk.

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Water Use and Distribution

Source	-	Municipal Supply
Volume	-	7,700 gpd (avg over 1970)
Distribution	-	1,700 gpd sanitary
		6,000 gpd industrial*

* No breakdown of industrial water usage was available but usage included boiler make-up, once-through cooling water and laboratory wash water.

Sources and Disposal of Liquid Wastes

In this plant all sanitary wastes are discharged to the sanitary sewer system. Small quantities of spent grinder coolant and soluble cutting oil are used to control parking lot dust. Also, four pints of trichloroethylene per week are disposed of in a similar way. Water used for cooling degreasing equipment and washwater from the laboratory are discharged to the storm water system.

DISCUSSION AND RECOMMENDATIONS

All industrial wastes from this plant are discharged to the storm sewer system. It might be desirable to segregate and discharge laboratory clean-up wastewaters to the municipal sanitary sewer system.

PERTH METAL INDUSTRIES LIMITED

This plant, located at 128 Monteith Street, produces powdered metal parts.

SUMMARY

All industrial wastes from this plant are discharged to the municipal storm sewer system. These wastewaters are once-through indirect cooling water and are suitable for this type of disposal.

DETAILS OF SURVEY

Perth Metal Industries was visited and surveyed on June 16, 1971.

Personnel Interviewed

Mr. S. Thompson - Plant Manager

Description of Plant Processes

Metal parts are formed by first compressing powdered zinc stearate into the desired shape and then alloying this with other powdered metallic material in a heating process to produce the final product.

Production and Operating Data

Total Number of Employees	-	30
Production Employees	-	20
Operating Schedule	-	2 - 8 hr. shifts/day 5 days/wk.

Water Use and Distribution

Source	-	Municipal Supply
Volume	-	8,500 gpd (avg over 1970)
Distribution	-	1,800 gpd domestic
		6,700 gpd cooling

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Source and Disposal of Liquid Wastes

All industrial wastewater is used for cooling and is discharged to the municipal storm sewer system. Sanitary wastes are discharged to the sanitary sewer system. Between 1500 and 2000 gallons of oil a year are used to treat the product, generating between 150 - 180 gallons per year of waste oil. This oil is collected and used to control dust in the parking lot area.

Sampling and Analysis

Presented below are the analytical results of a sample taken from the sewered plant effluent on June 16, 1971 -

Sample Description:

#1 : Cooling water discharge to the Storm Sewer System (Grab Sample)

SAMPLE NO.	5-DAY BOD	S O L I D S			pH AT LAB.	COPPER	IRON	LEAD
		TOTAL	SUSP.	DISS.				
1	1.4	830	5	825	7.7	0.0	.29	0.0

All analyses except pH expressed in parts per million

CONCLUSIONS

At the time this plant was surveyed the effluent discharged to the storm sewer met both the Municipal By-law limits for discharge to a storm sewer and the Ministry of Environment objectives for discharge to a watercourse.

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RELIANCE ELECTRIC LIMITED

This plant, located at 678 Erie Street, is engaged in the manufacturing of large industrial motors and variable speed drives.

SUMMARY

The wastes discharged to the sanitary sewers appeared to be of acceptable quality, being mainly cooling water. Segregation of this waste to the storm sewer should be undertaken when storm sewers become available.

DETAILS OF SURVEY

Reliance Electric was visited on June 3, 1971.

Description of Plant Processes

Bar and sheet steel are welded and machined to form the armature for the motors. The prepared windings for these motors are then coated with varnish material and the motor is assembled.

Electronic control panels for these motors are also fabricated at this plant. Large quantities of water are pumped to load test these motors before they are released to the customer.

Production and Operating Data

Total Number of Employees	-	113
Production Employees	-	77
Operating Schedule	-	8 hrs/day 5 days/wk
Production	-	15 large motors/month
	-	20-30 control units/month

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Water Use and Distribution

Source	-	Municipal Supply
Volume	-	25,000 gpd (avg over 1971)
Distribution	-	2,000 gpd sanitary
		23,000 gpd process

Sources and Disposal of Liquid Wastes

All liquid sanitary wastes are discharged directly to the sanitary sewer system. Water used for the load-testing of motors is discharged to the sanitary sewer.

Sampling and Analysis

Since only normal sanitary wastes and uncontaminated industrial wastes are discharged from this plant, no samples were taken.

DISCUSSIONS

At the time of the survey the wastes from this plant were apparently satisfactory for discharge to the sanitary sewer system. The Company should be advised to divert any uncontaminated wastes to the storm sewer system as soon as it becomes available for use.

Lacking storm sewers, the Company should consider recirculating the water used for motor test purposes, thus saving on water costs and eliminating an unnecessary hydraulic load on the sanitary sewer system.

SAMSONITE OF CANADA LIMITED

This plant, located at 753 Ontario Street, is engaged in the production of luggage and plastic toys.

SUMMARY

Wastes from this plant are discharged to both the sanitary and storm sewer systems. According to samples taken during this survey, the effluents to both sewer systems were acceptable as they comply with the Municipal Sewer-use By-law limits and Ministry of the Environment wastewater effluent objectives.

DETAILS OF SURVEY

This plant was visited and surveyed on June 15, 1971 and July 7, 1971.

Personnel Interviewed

Mr. W. J. Burgess - Engineer Manager

Mr. P. Iybergen - Maintenance Superintendent

Description of Plant Processes

In this plant plastic resins are formed into plastic panels and parts by injection molding. These panels and parts are then assembled to form the final products (luggage). Some metal parts, needed for the product, are produced in the plant. Job phosphating and painting are also carried out at the plant.

Production and Operating Data

Total Number of Employees - 160

Production Employees - 100

Operating Schedule - 1 shift/day in assembly area

- 2 and 3 shifts/day in plastic area;

5 days/wk.

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Water Use and Distribution

Source	-	Municipal Supply
Volume	-	57,000 gpd (avg over 1970)
Distribution	-	3,000 gpd sanitary
	-	28,000 gpd for cooling
	-	20,000 gpd for process
	-	6,000 gpd for water softener regeneration.

Sources and Disposal of Liquid Wastes

Wastes from this plant are discharged to both sanitary and storm sewers. Approximately 50 per cent of the total industrial wastewaters are discharged to the storm sewer system. This water includes once-through indirect cooling water used in extruder cooling, mould cooling and other operations in forming plastic parts, plus approximately 6,000 gallons per day of water used in the regeneration of a water softener unit.

Other wastewaters (the remaining 50 per cent) are discharged to the sanitary sewer. This waste stream is made up of running rinses from the phosphating line, waste from paint booth dumps (two to three times a year), waste from the dump of a caustic paint stripping tank (once every two years), and a dump of 700 gallons of spent chromic acid every two months. The chromic acid is treated to reduce hexavalent chromium and settled before discharge.

Sampling and Analysis

Presented below are the analytical results of samples taken from the sewered plant effluents on June 15, 1971 and July 6, 1971.

Sample Description:

#1 : Plant effluent discharged to Storm Sewer System (2 hour composite at 30-min. intervals)

#2 : Chrome Tank after treatment ready for discharge (Grab)

#3 : Hot Running rinse from Phosphating Line (Grab)

#4 : Cold Running rinse from Phosphating Line (Grab)

SAMPLE NO.	5-DAY BOD	SOLIDS TOTAL	SOLIDS SUSP.	SOLIDS DISS.	pH AT LAB.	IRON as Fe	COD	CHROME TOTAL	CHROME HEX
1	.8	760	5	755	8.1	1.0	<10		
2	-	3170	20	3150	6.0	-	-	.12	0.0
3	9.0	760	20	740	8.6	-	<10	-	-
4	2.5	760	5	755	8.1	-	<10	-	-

CONCLUSIONS

The effluent discharge from Samsonite to the storm sewer at the time of sampling was within the Municipal Sewer-use By-law limits. Since samples could not be obtained of the discharge to the sanitary sewer system, in-plant samples were taken to determine if these industrial wastes contained high concentrations of contaminants which could interfere with the operation of the sewage treatment plant. The analytical results indicate that none of the wastes sampled should interfere with the operation of the sewerage system as they comply with Municipal Sewer-use By-law limits.

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SCHWITZER DIVISION WALLACE-MURRAY CANADA LIMITED

This plant, located at 818 Erie Street, produces fan blades and anti-vibration dampers.

SUMMARY

All wastes from this plant are discharged to the sanitary sewer system. Although oil-bearing wastes are treated in a gravity oil separator, at the time of the survey treatment provided was inadequate and oil in excess of City of Stratford Sewer-use By-law limits was present in the discharge. Recommendations are presented in the report to overcome the problems noted.

DETAILS OF SURVEY

This plant was visited and surveyed on June 3, 1971.

Personnel Interviewed

Mr. A. W. Tuckwood	-	Plant Engineer
Mr. B. May	-	Machine Shop Maintenance Foreman

Description of Plant Processes

In this plant cast anti-vibration dampers are machined and balanced and fan blades are stamped out of sheet steel stock and assembled into cross-blades.

Production and Operating Data

Total Number of Employees	-	82
Production Employees	-	75
Operating Schedule	-	2 - 8 hr. shifts/day 5 days/week

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Water Use and Distribution

Source	-	Municipal Supply
Volume	-	210,000 gpd (avg in 1970)
Distribution	-	2,000 gpd sanitary
	-	208,000 gpd industrial process*

* No distribution data on industrial water use was available.

Sources and Disposal of Liquid Wastes

All wastewaters are discharged to the municipal sanitary sewer system.

Industrial water is used for rinsing in the anti-vibration damper washing and grinding operations. In addition, water is used for compressor cooling water. Oily waste flows from processing operations are discharged to a three-compartment gravity oil separator.

An additional source of oily wastewater at the time of the survey was the drainage from the plant's oily chip storage area.

A number of tanks containing spent cleaners used to remove oil from the anti-vibration dampers are dumped, at one and two month intervals, to the three-compartment separator.

The Company also dumps the contents of a paint spray booth to the sanitary sewer about once per year.

Periodically, a local contractor pumps oil from the separator and hauls it away for land disposal.

Sampling and Analysis

Representative samples of the plant's waste discharge to the municipal sanitary sewer could not be obtained as there was no access to the combined plant sewer

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discharge. Therefore, samples were obtained from the municipal sanitary sewer above and below the point of discharge of Schwitzer's wastes and flows were measured at both locations. The flows were estimated to be 1,000,000 gpd below Schwitzer and 760,000 gpd above Schwitzer's.

Analytical data and sample descriptions are presented below:

Sample Description:

#1 : Sanitary Sewer - above Schwitzer's (Grab)

#2 : Sanitary Sewer - below Schwitzer's (Grab)

SAMPLE NO.	5-DAY BOD	S O L I D S			pH AT LAB.	COD	ETHER SOLUBLE	TOTAL IRON as Fe
		TOTAL	DISS.	SUSP.				
1	14	7120	6250	870	9.6	155	11	5.6
2	42	3350	3170	180	8.1	230	32	18.4

Waste Loadings

Loadings were calculated for the sanitary sewer above and below the Schwitzer plant. By difference, Schwitzer plant loadings were estimated as follows:

BOD_5 (Biochemical Oxygen Demand) - 330 lbs/day

COD (Chemical Oxygen Demand) - 1200 lbs/day

Iron - 85 lbs/day

Ether Solubles (Oil) - 250 lbs/day

CONCLUSIONS AND RECOMMENDATIONS

At the time of the survey the wastes discharged from this plant did not meet the Municipal Sewer-use By-law limits for oil. The unsatisfactory conditions evident could be attributed to a number of factors. First, the

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three-compartment separator was not of adequate size to handle the oily waste flow rates. In addition, the inlet and outlet to the separator were not properly designed for efficient operation of the separator. Since much of the oil would be in an emulsified state, it would not be removed by gravity separation alone.

Since the time of the survey, the Company has made modifications which should improve conditions. That is, a covered concrete curbed area has been constructed so that oil draining from chip buckets is contained for suitable disposal. The area has been covered to prevent oil being carried away with surface runoff. In addition, the Company has indicated that the amount of oil, emulsifiable in particular, that reaches the oil separator has been reduced to little or nothing.

If the changes which the Company has made do not result in complete correction of problems noted, the following recommendations should be implemented:

1) All oil-free water (i.e. compressor cooling water) should be segregated for separate and direct discharge to the sanitary sewer, thus by-passing any oil separation facilities. If and when storm sewer facilities are provided in the area, this wastewater should be re-routed to discharge to them.
2) Oil separation facilities should be re-designed to provide for adequate retention time and be equipped with proper inlet and outlet structures.
3) Any wastewaters containing emulsified oil should be chemically treated to break the emulsion before they are discharged to the oil separator.

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4) Batch dumps of cleaning solutions containing oil should be chemically treated to free the oil before discharge to the separator, or these dumps should be disposed in an alternate manner acceptable to all regulatory authorities.

SEALED POWER CORPORATION OF CANADA LIMITED

Sealed Power Corporation, located at Packham Road, produces piston rings and thrust rings.

SUMMARY

All wastes from the plant are discharged to the municipal sanitary sewer system. These wastes are mainly generated in the plating department and were found to be suitable for discharge to the sanitary sewer system.

DETAILS OF SURVEY

Sealed Power was visited and surveyed on July 8, 1971.

Personnel Interviewed

Mr. F. Wirth - Plant Engineer

Description of Plant Processes

Cast iron and steel stock are machined to produce piston rings and thrust rings. These operations require that large amounts of coolant oils be used. The Company has installed an oil recirculation system which allows spent oil to be re-used in the plant.

The machined rings are hard chrome-plated in a conventional plating line.

Production and Operating Data

Total Number of Employees	-	140
Production Employees	-	110
Operating Schedule	-	3 - 8 hr. shifts/day 6 days/week
Production Volume	-	600,000 steel piston rings/wk. 260,000 thrust rings/wk.

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Water Use and Distribution

Source	-	Municipal Supply
Volume	-	220,000 gpd (avg. over 1970)
Distribution	-	3,000 gpd sanitary
	-	217,000 gpd industrial*

* No distribution data available

Sources and Disposal of Liquid Wastes

In this plant, wastes can be divided into two classes: water-borne wastes and liquid non-aqueous wastes.

The water-borne wastes result from four main areas of the plant: a) cooling water from degreasers, b) cooling water and running rinses from the plating tanks, c) cooling water from compressors and d) running rinses from the metal cleaning line. All of these wastes are discharged to the sanitary sewer system (no storm sewer system is yet available in this area.)

The non-aqueous wastes include spent degreasing fluid, removed to the city land-fill site at two-week intervals (20 - 25 gallons 60 per cent $v/_v$ oil, 40 per cent $v/_v$ trichloroethylene) and spent chromic acid, taken away under contract by H. C. Nelson for reprocessing. The only other waste material is cutting oil used in machining rings. This oil is filtered after use to remove solid material (metal) and then re-used in the plant. It was reported that the Company has had no waste oil to dispose of since this system was installed.

Sampling and Analysis

Presented below are the analytical results of the samples taken of the sewered effluents on July 8, 1971.

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Sample Description:

#1 : Final plant effluent to Sanitary Sewer (Grab)

#2 : Plating Room effluent (Grab)

SAMPLE NO.	5-DAY BOD	SOLIDS			pH	COD	CHROMIUM		TOTAL PHOSPHOROUS as P
		TOTAL	SUSP.	DISS.			TOTAL	HEX.	
1	6.0	1300	80	1220	7.0	30	.31	.10	4.1
2	-	-	-	-	8.6	-	.28	.21	-

Waste Loadings

Based on the analytical results and the water use data, the daily waste loadings to the sanitary sewer system were found to be:

Suspended Solids			-	170 lbs/day
COD (Chemical Oxygen Demand)			-	65.0 "
Total Phosphorous			-	8.9 "
Chromium	-	Total	-	0.67 "
		Hexavalent	-	0.21 "

CONCLUSIONS AND RECOMMENDATIONS

The analytical results of samples show that, at the time of the survey, the effluent from this plant was suitable for discharge to the sanitary sewer system. Routine monitoring of this effluent for chromium and pH is recommended.

The suitability of disposing of spent solutions at the municipal land-fill site is questionable. The Company should investigate alternate methods of disposal and ensure that plant practices followed are acceptable to the Ministry of the Environment

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A. O. SMITH CONSUMER PRODUCTS (CANADIAN) DIV.

This plant, located at 768 Erie Street, is engaged in the production of water heaters and water boilers.

SUMMARY

Wastewaters generated in this plant met the City of Stratford Sewer-use By-law for a discharge to the sanitary sewers.

DETAILS OF SURVEY

The A. O. Smith plant was visited on July 7, 1971 and samples of the plant wastes were obtained.

Personnel Interviewed

Mr. D. Bain - Plant Foreman

Description of Plant Processes

In this plant, tubular heat exchangers are fabricated, then assembled into boilers and water heaters. The assembled boilers and heaters are painted before they leave the plant.

Production and Operating Data

Total Number of Employees	- 9
Production Employees	- 7
Operating Schedule	- 8 hr./day 5 days/week

Water Use and Distribution

Source	- Municipal Supply
Volume	- 10,000 gpd (avg. of 1970)
Distribution	- 250 gpd sanitary
	- 9,750 gpd process wastewater

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Sources and Disposal of Liquid Wastes

The only industrial wastewaters in this plant come from a phosphating treatment of parts which are to be painted. Rinse waters from this operation are discharged untreated to the sanitary sewer system. About once every six months both of the phosphating tanks are dumped. The contents of the two tanks are mixed together to effect neutralization and then this solution is discharged directly to the sanitary sewer system.

Sampling and Analysis

Grab samples were taken of each of the treatment solution tanks and the running rinse.

The analytical results and sample descriptions were as follows:

Sample Description:

#1 : Acid Tank of Phosphating line.

#2 : Cleaner Tank of Phosphating line.

#3 : Running Rinse Tank of Phosphating line.

SAMPLE NO.	S O L I D S TOTAL	SUSP.	DISS.	pH AT LAB.	TOTAL IRON as Fe	TOTAL TIN as Sn	TOTAL ZINC as Zn	TOTAL PHOSPHOROUS as P
1	7500	30	7470	5.8	3.4	0.0	0.10	700
2	54650	43800	10850	9.6	10.2	0.0	0.96	115.0*
3	1240	10	1230	8.7	0.1	L .01	0.10	11.0

* Interference due to high iron content

L - less than

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Waste Loadings

Waste loadings from the plant, based on the water use data and the running rinse analytical results, have been estimated as follows:

Suspended Solids	2.9 lbs/day *
Total Iron	0.3 lbs/day *
Total Phosphorous	1.0 lb/day *

* Total loadings based on running rinse flow of 9,750 gpd.

At the time when treatment tanks are dumped, there is an additional loading of 6.5 lbs of phosphorous to the sanitary sewer system.

CONCLUSIONS AND RECOMMENDATIONS

The discharge to the sanitary sewer at the time of sampling met the City's by-law limits for discharge. The plant wastes should cause no problems in the sewer system, providing spent solutions are neutralized before they are dumped.

It should be noted that this plant's wastes represent a small source of phosphorous; however, because the annual phosphorous loading from this plant is only in the order of 13 pounds, it is questionable whether there would be any advantage to having the Company treat for phosphorous removal before discharge to the municipal system.

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SQUARE D COMPANY OF CANADA LIMITED

This plant, located at 472 Lorne Street East, produces electrical distribution equipment.

SUMMARY

All wastes from this plant (with the exception of roof drains) were being discharged to the sanitary sewer system. Metallic hydroxide sludges resulting from the treatment of electroplating wastewaters were being trucked to the municipal land disposal site. No worthwhile conclusions could be drawn from this survey, owing to inadequate sampling. A review survey of the facilities is recommended.

DETAILS OF SURVEY

Square D Company was visited and surveyed on July 7, 1971 and August 20, 1971.

Personnel Interviewed

Mr. Glandfield - Industrial Engineering

Description of Plant Processes

In this plant, sheet steel is transformed by a number of stamping, plating, spot welding, assembly and painting operations into electrical distribution equipment.

Production and Operating Data

Total Number of Employees	-	150
Production Employees	-	135
Operating Schedule	-	2 - 8 hr. shifts 5 days/week.

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Water Use and Distribution

Source	-	Municipal Supply
Volume	-	26,000 gpd
Distribution	-	3,000 gpd sanitary
	-	16,000 gpd electroplating
	-	6,000 gpd welder cooling
	-	1,000 gpd phosphating line

Sources, Treatment and Disposal of Liquid Wastes

All waste waters from this plant were discharged to the municipal sanitary sewer. The wastewaters originate from the following sources: uncontaminated cooling water from welders and compressors; contaminated waters from a phosphating line and the plating department. The uncontaminated waters and the wastes from the phosphating line were discharged directly to the sanitary sewer with no treatment.

Running rinses from the plating area are passed through anion-cation exchangers to remove zinc, copper, chromium and cyanide components; then these rinses are reused in the plating operation.

Regenerant wastes from the anion-cation exchangers are chemically treated to oxidize cyanide and reduce hexavalent chromium to trivalent chromium. The wastes are then neutralized to precipitate all metals as hydroxides. The sludge is allowed to settle and the supernatant is decanted to the sanitary sewers. The settled sludge is then hauled to the local land disposal site.

Sampling and Analysis

Presented below are the analytical results of the samples taken from the sewered effluent on July 7, 1971 and August 20, 1971 -

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Sample Description:

#1 : Ion exchange regenerant (Grab)

#2 : Ion exchange regenerant after treatment and settling (Grab)

#3 : Compressor cooling water (Grab)

#4 : Phosphating line running rinse (Grab)

SAMPLE NO.	5-DAY BOD	SOLIDS			pH AT LAB.	COD	CHROMIUM		CYANIDE as HCN	ZINC	COPPER
		TOTAL	SUSP.	DISS.			TOTAL	HEX.	(Preserved)		
1	22	11430	1430	10000	1.4	20	1.5	0.0	1.3	1.78	1.20
2	-	-	200	-	10.4	40	.4	.1	-	-	-
3	0.6	890	5	885	7.8	10	-	-	-	-	-
4	7.0	950	10	940	8.9	25	-	-	-	-	-

All analyses except pH expressed in parts per million

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

A review of the analytical data presented a confusing picture as to the efficiency of waste treatment at this plant. One would expect that the untreated ion exchange regenerant at a pH of 1.4 would be relatively free of suspended solids and would contain high concentrations of heavy metals in solution. In this case the reverse is true. Even had samples been mislabelled or interchanged, there would still be no reasonable explanation for the results.

No conclusions can be reached and it is recommended that this plant be resurveyed at an early date.

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STANDARD PRODUCTS (CANADA) LIMITED

(Plant #1)

Plant #1 of Standard Products is located at 1030 Erie Street (Head Office) and is involved in the production of automotive weather stripping.

SUMMARY

The wastewaters from this plant were found to be acceptable for discharge to the sanitary sewer system.

DETAILS OF SURVEY

Standard Products was visited and surveyed on July 6, 1971 and July 8, 1971.

Personnel Interviewed

Mr. D. Tasker - Plant Superintendent

Mr. B. Murray - Plant Manager

Description of Plant Processes

Rubber is extruded into the required shapes and then cut and assembled into automotive weather stripping. This product is then packaged for shipment to the customer.

Production and Operating Data

Total Number of Employees	- 161 - 200
Production Employees	- 100 - 150
Operating Schedule	- 2 - 8 hr.shifts/day 5 days/week
Production Volume	- 10,000 pieces/day

Water Use and Distribution

Source	- Municipal Supply
Volume	- 35,000 gpd (avg. over 1970)
Distribution	- 2,000 gpd sanitary
	- 33,000 gpd industrial

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Sources and Disposal of Liquid Wastes

Industrial wastewaters consist of cooling water used on extruders for rubber products, air conditioning cooling units and mold cleaning operations. These wastes are discharged to the sanitary sewer system. Some compressor cooling water is discharged to the plant ditches.

Sampling and Analysis

Presented below are the analytical results of the samples taken from the sewered plant effluent on July 8, 1971.

Sample Description:

#1 : Plant effluent discharged to the Sanitary Sewer system.

SAMPLE NO.	5 - DAY BOD	S O L I D S			pH AT LAB.	TOC
		TOTAL	SUSP.	DISS.		
#1	11	1160	80*	1080	6.9	4.0

* Solid material separated from the sample by filtration was characterized as carbon black used as a filler in manufactured rubber products.

CONCLUSIONS

On the day of this survey the wastes discharged to the sanitary sewer from Plant #1 were within the by-law limits. Most of the solid material contained in the discharge to the sanitary system was found to be small bits of rubber containing carbon black, no doubt arising from mold washing operations.

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STANDARD PRODUCTS (CANADA) LIMITED

(Plant #2)

Plant #2 of Standard Products is located at 342 Erie Street, where rubber automotive stripping is produced.

SUMMARY

At the time of the survey, wastewaters were found acceptable for discharge to the storm sewer system. The screening facilities should be regularly inspected and cleaned by Company personnel.

DETAILS OF SURVEY

Standard Products, Plant #2, was visited and surveyed on July 8, 1971.

Personnel Interviewed

Mr. F. Pearce - Plant Superintendent

Description of Plant Processes

In this plant rubber automotive weather stripping is continuously extruded from rubber produced in Standard Products (Canada) Limited Plant #3.

Production and Operating Data

Total Number of Employees	-	77
Production Employees	-	68
Operating Schedule	-	5 days/week

Water Use and Distribution

Source	-	Municipal Supply
Volume	-	45,000 gpd (avg over 1970)
Distribution	-	2,000 gpd sanitary
	-	43,000 gpd cooling

Sources and Disposal of Liquid Wastes

All industrial wastewaters from this plant are screened to remove large rubber chunks prior to discharge

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to the storm sewer system. This water is used for direct contact cooling. All sanitary wastes are discharged to the sanitary sewer.

Sampling and Analysis

Presented below are the analytical results of the sample taken from the sewered plant effluent on July 8, 1971.

Sample Description:

#1 : Cooling water discharged from contact cooling tank (Grab)

SAMPLE NO.	5-DAY BOD	SOLIDS			pH AT LAB	COD	TOC
		TOTAL	SUSP.	DISS.			
1	2.0	890	5	885	6.9	<30	1.5

CONCLUSIONS AND RECOMMENDATIONS

At the time of the survey the effluent discharged to the storm sewer system was within the Ministry of the Environment objectives and Municipal Sewer-use By-law limits for discharge to watercourses and storm sewers.

Periodic checks should be made by the Company to maintain the screens that are used to remove chunks of rubber before these wastes are discharged to the storm sewer.

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STANDARD PRODUCTS (CANADA) LIMITED

(Plant #3)

Plant #3 is located at 341 Erie Street and produces synthetic rubber for use in the Company's other two plants in Stratford.

SUMMARY

In this plant cooling water is used for the cooling of a banbury mill and extruder. This wastewater is discharged to a creek behind the plant and at the time of the survey was of acceptable quality for such disposal. Care in handling oil should be a high priority at this plant.

DETAILS OF SURVEY

Standard Products, Plant #3, was visited and surveyed on July 8, 1971.

Personnel Interviewed

Mr. G. Adair - Plant Superintendent

Description of Plant Processes

In this plant natural and synthetic rubbers are blended together along with carbon black and process oils to produce a finished rubber compound. Some of this rubber is then extruded into the desired form.

Production and Operating Data

Total Number of Employees	-	75
Production Employees	-	50
Operating Schedule	-	3 - 8 hr shifts 5 days/week
Production Volume	-	37,000 lbs/day

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Water Use and Distribution

Source	-	Municipal Supply
Volume	-	47,000 gpd (avg over 1970)
Distribution	-	1,500 gpd sanitary
	-	45,500 gpd industrial cooling water

Sources and Disposal of Liquid Wastes

Industrial wastes from this plant result from blending and extruding operations. These wastes are cooling water used for both direct and indirect cooling in the processes. These wastes are discharged to the creek behind the plant. The creek then becomes part of the storm sewer system.

All normal sanitary wastes are discharged to the sanitary sewer system.

Sampling and Analysis

Presented below are the analytical results of samples taken from the sewered plant effluent on July 8, 1971.

Sample Description:

#1 : Cooling water effluent at north-east corner of plant.

#2 : Cooling water effluent at south-east corner of plant.

SAMPLE NO.	5-DAY BOD	SOLIDS			pH AT LAB	COD	TOC
		TOTAL	SUSP.	DISS.			
1	1.6	1320	5	1315	6.8	<30	1.0
2	1.2	970	5	965	6.9	<30	3.6

CONCLUSIONS AND RECOMMENDATIONS

At the time of the survey the effluents discharged to the storm sewer system were within Municipal Sewer-use By-law

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limits and Ministry of the Environment objectives for discharge to storm sewers and watercourses. Because substantial amounts of oil are used in the rubber making at this plant, plant personnel should maintain strict surveillance on oil usage in the plant to ensure that no oil is lost through spills or accidents to the sewer system.

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APPENDIX I

ALPHABETICAL LIST OF INDUSTRIES IN STRATFORD

BELGIUM STANDARD INDUSTRIES
PRODUCT - BELT,GRAVITY,ROLLER CONVEYORS, COMPACTION EQUIPMENT

BEACON HERALD OF STRATFORD LIMITED
PRODUCT - DAILY NEWSPAPER

B-H PRESS
PRODUCT - COMMERCIAL PRINTING

BETTGER INDUSTRIES LIMITED
PRODUCT - MECHANICAL POWER , TRANSMISSION EQUIPMENT

BLACKSTONE INDUSTRIAL PRODUCTS LIMITED
PRODUCT - AUTOMOTIVE RADIATORS & HEATER CORES

BRISTOL-MYERS PRODUCTS CANADA LIMITED
PRODUCT - MOPS, BROOMS, SPONGE MOPS, FURNITURE POLISH

CANADIAN FABRICATED PRODUCTS LIMITED
PRODUCT - INTERIOR AUTOMOTIVE TRIM

CANADIAN HARDINE MACHINE TOOLS LIMITED
PRODUCT - COLLETS, FEED FINGERS & PADS

CANADIAN NATION RAILWAYS

CLAY, T. MANUFACTURING LIMITED
PRODUCT - CONTRACT MACHINING-WELDING

CLAYTON MARK (CANADA) LIMITED
PRODUCT - WATERWELL SUPPLIES, BALL VALVES, STAINLESS STEEL UNIONS

CLEAVER-BROOKS OF CANADA LIMITED
PRODUCT - PACKAGE BOILERS

COMMERCIAL PRINTERS
PRODUCT - JOB PRINTING

COMMUNICATION APPARATUS CO. CAN. LTD.
PRODUCT - TELEPHONE EQUIPMENT

COOPER-BESSEMER OF CANADA LIMITED
PRODUCT - COMPRESSORS & DIESEL ENGINES

CORRUGATED PIPE COMPANY LIMITED
PRODUCT - STEEL CULVERTS AND ROOFING, STEEL BEAM GUIDE RAIL

CRANE CANADA LIMITED
PRODUCT - PORCELAIN ENAMELLED STEEL PLUMBING FIXTURES, BATHTUBS, LAVATORIES, SINKS, LAUNDRY TUBS

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DOMINION CHAIN COMPANY LIMITED
PRODUCT - CHAIN PRODUCTS, CABLE PRODUCTS, STEEL FORGINGS

DOUBLE COLA OF CANADA LIMITED
PRODUCT - CONCENTRATES, FLAVOURS

ECBECO (HURON) LIMITED
PRODUCT - SOFT DRINKS

FAG BEARINGS LIMITED
PRODUCTS - PRECISION BEARINGS AND PRECISION INSTRUMENT BEARINGS

FAIRFIELD FURNITURE INDUSTRIES LTD.
PRODUCT - UPHOLSTERED CHAIRS AND SOFAS

FAULTLESS CASTERS LIMITED
PRODUCT - CASTER MANUFACTURING

FESTIVAL CITY ICE LTD.
PRODUCT - ICE & COLD STORAGE

FESTIVAL CITY METAL FABRICATORS
PRODUCT - STEEL FABRICATED PRODUCTS

FLEXSTEEL INDUSTRIES (CANADA) LIMITED
PRODUCT - UPHOLSTERED FURNITURE, CASE GOODS, AND CONTRACT FURNISHINGS

FRAM CANADA LIMITED
PRODUCT - AUTOMOTIVE, FARM, MARINE, AVIATION, PETROCHEMICAL FILTRATION PRODUCTS AND SYSTEMS

GRIFFITH SADDLERY AND LEATHER LTD.
PRODUCT - SADDLES, HARNESS & RIDING ACCESSORIES

HASTINGS & SONS FOUNDRY
PRODUCT - GREY, IRON AND ALUMINIUM CASTINGS

HEADWATER-PERTH CHEESE & FOODS LTD.
PRODUCTS - CHEESE

HENDRICKSON MFG. (CANADA) LIMITED
PRODUCT - TRUCK TANDEM SUSPENSIONS, LEAF SPRINGS AND PRECISION STEEL TUBING METALS

HERCULES SHAFT & SPLICE COMPANY LTD.
PRODUCT - SHAFTS, SPLICES & PARTS FOR SULKIES AND CARTS

IMPERIAL FURNITURE MFG. CO. LIMITED
PRODUCT - HOUSEHOLD AND CONTRACT FURNITURE

INTERNATIONAL ARTCRAFTS COMPANY LIMITED
PRODUCT - WEDDING INVITATIONS, PERSONAL STATIONERY, GREETING CARDS, BUSINESS STATIONERY, PERSONALIZED ITEMS

JONES MANUFACTURING CO. LIMITED
PRODUCT - METAL STAMPINGS, ETAL FABRICATING, TOOLS AND DIES, JIGS AND FIXTURES, CUSTOM MACHINING AND WELDING

JUDGE SIGNS
PRODUCT - TRUCK LETTERING, SIGNS

KINKADE STRATFORD SHEET METAL LIMITED
PRODUCT - SHEET METAL PRODUCTS & FEED MILL EQUIPMENT

KIST CANADA LIMITED
PRODUCT - FLAVOURING COMPOUNDS, CONCENTRATED JUICES

KORLIN LIMITED
PRODUCT - EXTRUDED PLASTIC SHEET, COLOUR CONCENTRATE

KRAVEN KNITTING LIMITED
PRODUCT - KNITTED OUTERWEAR

KROEHLER MANUFACTURING COMPANY LIMITED
PRODUCT - UPHOLSTERED FURNITURE AND CASE GOODS

THE LEISURE GROUP, CANADIAN OPERATIONS
PRODUCT - WERLICH TOBOGGANS, SLEIGHS AND SNOW TOYS

MARLETTE HOMES OF CANADA LTD.
PRODUCT - STRUCTURAL & MOBILE HOUSING UNITS

R. T. MCBRIDE LTD.
PRODUCT - MECHANICAL & ELECTRICAL CONTRACTORS

MIRROR PRESS LIMITED
PRODUCT - COMMERCIAL PRINTING & LITHOGRAPHY

NEUHAUSER HATCHERIES LIMITED
PRODUCT - BABY CHICKS

NOVATRONICS OF CANADA LIMITED
PRODUCT - PRECISION ELECTRO-MECHANICAL AND ELECTRONIC COMPONENTS AND SYSTEMS

O'HARA MACHINE & SUPPLY COMPANY
PRODUCT - MACHINE WORK & STEEL SUPPLIES

OLIN BROWN CANDIES LTD.
PRODUCT - CANDY AND CHOCOLATES, AND SMALL GIFT LINE

PERTH CONCRETE PRODUCTS LIMITED
PRODUCT - READY MIXED CONCRETE

PERTH METAL INDUSTRIES LIMITED
PRODUCT - SELF LUBRICATING OILITE BEARINGS, CORED AND SOLID BARS SPECIAL SHAPES AND METAL FILTERS, FINISHED MACHINE PARTS

PRESTONIA STATIONERY MANUFACTURING LIMITED
PRODUCT - STATIONERY & OFFICE SUPPLIES

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RELIANCE ELECTRIC LIMITED
PRODUCT - ELECTRIC MOTORS & INDUSTRIAL CONTROLS

RODWELL MANUFACTURING COMPANY
PRODUCT - CUSTOM WOODWORKING

SAMSONITE OF CANADA LIMITED
PRODUCT - LUGGAGE, CUSTOM MOLDING, TOYS

SCHOLAR'S CHOICE LIMITED
PRODUCT - WORKBOOKS, EDUCATIONAL KITS

SCHWITZER DIVISION, WALLACE-MURRAY CANADA LIMITED
PRODUCT - VIBRATION DAMPERS AND FANS

SEALED POWER CORP. OF CANADA LIMITED
PRODUCT - PISTON RINGS AND THRUST PLATES

SMITH, A. O. CONSUMER PRODUCTS (CANADIAN) DIV.
PRODUCT - HYDRONIC BOILERS AND COMMERCIAL WATER HEATERS

SQUARE D COMPANY CANADA LIMITED
PRODUCT - ELECTRICAL DISTRIBUTION EQUIPMENT

STANDARD PRODUCTS (CANADA) LIMITED
PRODUCT - AUTOMOTIVE AND INDUSTRIAL RUBBER PARTS

STRATFORD DISTRICT CO-OP
PRODUCT - FEED, SEED, FERTILIZER, FARM SUPPLIES, PETROLEUM, HARDWARE

STRATFORD PACKERS LIMITED
PRODUCT - PACKERS OF GERMAN STYPE MEATS

STRATFORD TEXTILES LIMITED
PRODUCT - KNITTED GOODS, SWEATERS

STRATFORD TIMES LIMITED
PRODUCT - WEEKLY NEWSPAPER AND PRINTING

SUPERIOR CONTINENTAL CANADA LIMITED
PRODUCT - TELEPHONE EQUIPMENT

SUPERIOR PROPANE LIMITED
PRODUCT - BULK & CYLINDER PROPANE, ALL GAS BURNING APPLIANCES

SUPERSWEET FEED (DIVISION OF ROBIN HOOD MULTIFOODS LTD.)
PRODUCT - ANIMAL AND POULTRY FEED

SWIFT CANADIAN CO. LIMITED, HATCHERY DIVISION
PRODUCT - BABY CHICKS

TOPNOTCH FEEDS LIMITED
PRODUCT - FEED, FARM SUPPLIES AND HOME & GARDEN CENTRE

TRIBICK SIGNS
PRODUCT - SIGNS, SIGN PAINTING AND LETTERING, SCREEN PRINTING

UNITED CO-OPERATIVES OF ONTARIO
PRODUCT - CHEMICAL FERTILIZER AND PLANT FOOD

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APPENDIX II

INDUSTRIAL DISCHARGES TO SANITARY SEWERS

LOADINGS, VOLUMES & OTHER PERTINENT INFORMATION

NAME	WASTE FLOW (GPD)	WASTE LOADINGS LBS/DAY
Sealed Power Corp. of Canada Limited	217,000*	suspended solids-170 chrome - 0.65
Square D Company of Canada Limited	23,000	N.A.
Schwitzer Division Wallace-Murray Canada Limited	208,000*	iron - 85; oils - 250 BOD_5 - 330
Standard Products (Canada) Limited #1	33,000(cw)	neg.
Crane Canada Limited	65,000*	suspended solids-25 (higher during batch dumps)
A. O. Smith Consumer Products (Canadian) Div.	10,000	neg.
FAG Bearings Ltd.	104,000	BOD_5 - 95; suspended solids-115; oils - 32
Reliance Electric Ltd.	23,000(cw)	neg.
Samsonite of Canada Limited	20,000	N.A.
Cooper-Bessemer of Canada Limited	39,000	some tin
	742,000	

* portion cooling water

cw-cooling water

NA-not available

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APPENDIX II (continued)

INDUSTRIAL DISCHARGES TO STORM SEWERS

LOADINGS, VOLUMES & OTHER PERTINENT INFORMATION

NAME	WASTE FLOW (GPD)	WASTE LOADINGS LBS/DAY
Dominion Chain Company Limited	140,000	cyanides - 2.2; chrome - 5.3
Korlin Limited	246,000	neg.
Samsonite of Canada Limited	34,000	neg.
Standard Products (Canada) Ltd. #3	45,500	neg.
Standard Products (Canada) Ltd. #2	43,000	neg.
Cleaver-Brooks of Canada Limited	16,000	neg.
Headwater-Perth Cheese & Foods Ltd.	19,000	neg.
Novatronics of Canada Limited	6,000	neg.
FAG Bearings Ltd.	127,000	some oil
Perth Metal Industries Limited	7,000	neg.
Blackstone Industrial Products Limited	137,000	zinc - 8; chrome-0.5; copper - 1;
Cooper-Bessemer of Canada Limited	13,000	neg.
	833,000	